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Observations on the geographical composition of the Sugar Grove flora *

ROBERT F. GRIGGS

The Sugar Grove area is one of those places which are sometimes found where the botanical interest of a large region may be said to come to a focus. Not only do the plant associations, both upland and lowland, characteristic of eastern Ohio reach their climax here as nowhere else but about one plant in eight of the native flora, nearly one hundred and twenty in all, reaches here the edge of its range. These include species stretching away in every direction, north, south, east, and west. A study of the ranges of these plants shows that the area is the key to an understanding of the plant geography of Ohio.

This region is a narrow strip of very rough and rugged sandstone country extending from near the town of Sugar Grove, Fairfield Co., Ohio, southward for about twenty miles to the canyon of Queer Creek east of South Bloomingville, Hocking Co. Its position is roughly indicated by an ellipse in FIGURES 1, 2. It is located at the end of the long lobe of the Alleghenian floral area which Merriam's† map shows stretching into northeastern Ohio, a location which of itself marks it as an interesting region. It has been long known as an exceedingly rich collecting ground and contains an unusual number of rare plants not found elsewhere in Ohio.

In most of the published work on plant geography the area considered is divided into zones which are plotted on the map. Although the boundary lines of the zones are always difficult to settle, this method reaches results satisfactory to the geographer, who is primarily interested in subdividing the area of the earth. Not so however to the botanist, who is interested in plants rather

* Contribution from the Botanical Laboratory of the Ohio State University No. 75.

† Merriam, C. Hart. Life zones and crop zones. U. S. Dept. Agr. Biol. Survey Bull. 10. 1898.

than in areas. For by this method no locality can be possibly assigned to more than two zones whereas the flora of most regions is composed of numerous groups of plants of diverse affinities. The adequate representation of these requires not one but many maps each portraying a typical range. In the present paper an attempt is made to treat the Sugar Grove flora in this fashion.*

It is however very difficult to secure the data necessary for a consideration of plant ranges and the results are necessarily crude in consequence. There has been as yet almost no exact research into the ranges of North American plants. Only in the case of a few specially interesting species has any great effort been made to ascertain the facts of distribution. The ranges assigned to our plants in the manuals, even the most careful of them, are to a considerable extent the result of tradition and guesswork and are frequently far from accurate, while in works like Hough's *Trees*, which is almost the only general work that has attempted to map ranges, the maps given are so inaccurate as to be almost useless for detailed work. The importance of reliable data of this sort may be brought out by an example. The chestnut, *Castanea dentata*, whose distribution is much talked of just now in estimates of the probable damage to be expected from the chestnut blight, *Endothia parasitica*, is usually given† as occurring over all of Ohio except the extreme northwest corner and much of Indiana. But in reality‡ it is confined to the vicinity of the Lake Shore around the western end of Lake Erie, is entirely absent from western Ohio but occupies eastern Ohio and stretches through the southern part of the state into southern Indiana—thus lessening the area susceptible to damage by the blight by something more than 10,000 square miles.

The labor involved in determining accurately the range of a single plant is not inconsiderable. There is not a single herbarium

* For his conception of this point of view and for the ideas which are stimulated and exchanged during many friendly discussions as well as for more specific suggestions the writer is very greatly indebted to Professor M. L. Fernald of the Gray Herbarium. For a discussion of the flora of Newfoundland from this point of view see his "Botanical Expedition to Newfoundland and Southern Labrador," *Rhodora* 13: 135-162. 1911.

† See map opp. p. 28 in Rep. Pennsylvania Chestnut Blight Conference. Harrisburg, 1912.

‡ See map opp. p. 180, l. c.

in the country large enough in itself to supply the data for a rough approximation of the range of even our better known species. He who would accumulate information of this sort must visit half a dozen herbaria to get even a general view of the ranges of our common plants. Recourse must also be had to numerous local floras, where such are available, and the correctness of their identifications must be taken on faith. Moreover even our best known species have not been collected enough as yet to supply

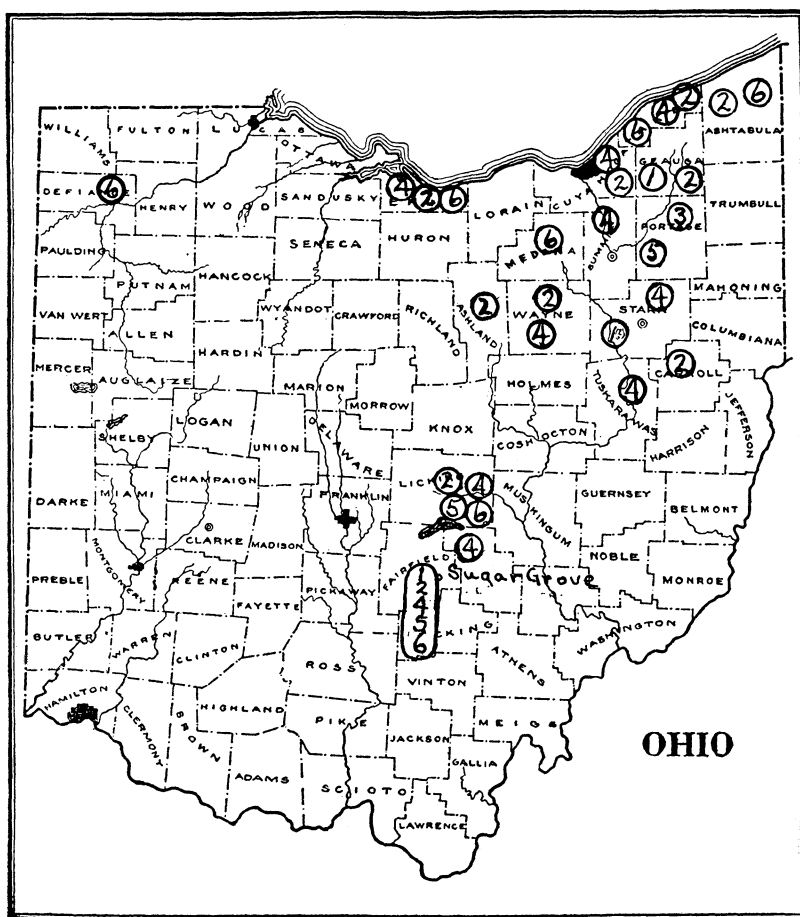


FIG. 1. Distribution of *Lycopodium* in Ohio.

- | | |
|----------------------------|--------------------------------------|
| 1. <i>L. clavatum</i> . | 4. <i>L. lucidulum</i> . |
| 2. <i>L. complanatum</i> . | 5. <i>L. lucidulum porophyllum</i> . |
| 3. <i>L. inundatum</i> . | 6. <i>L. obscurum</i> . |

satisfactory data as to their distribution and there are still hundreds of species the very characters of which are not yet understood.

The difficulty of getting adequate data for such work at present may be illustrated from Fernald's careful paper cited above, in which *Thuja occidentalis* is mapped as barely reaching Ohio whereas it occurs over the central and south central part of the state as far as Delaware, Champaign, and Highland counties; *Aster macrophyllus* likewise is found over northeastern Ohio to Hocking county, although it is given as barely touching the northeastern corner of the state. These illustrations are not cited in any spirit of criticism but at once to call attention to the importance of *local* work of this sort, and to forestall criticism of the maps given herewith, which are probably equally faulty.

It has seemed wise not to indicate the edges of the ranges but rather to show known stations. Those stations from which the writer has seen a specimen are marked with a "bullseye" while those which were compiled from the literature are marked by a circle without the central dot. The maps are thus capable of indefinite extension as more stations are found or more specimens seen.

Fortunately for the purposes of this paper we have in the state of Ohio, thanks to the energy and enthusiasm of the late Dr. W. A. Kellerman, a very representative state herbarium which is indexed by counties after the fashion of the state maps herewith reproduced. Although by no means complete as yet these maps enable one to learn relatively accurately the distribution of the flora over the state simply by glancing at the index. Curiously enough the distribution in Ohio often gives almost no clue as to the range of a species. Thus *Populus heterophylla* is confined to the northern half of Ohio but in Indiana it is confined to the southern portion! On further examination its range is found to be the Atlantic coastal plain from southern Connecticut around the Gulf coast and up the Mississippi and Wabash River systems to the basin of Lake Erie.

One's general expectation concerning plant distribution is, that being controlled by climate, the termini of the ranges follow the parallels of latitude in a general way, crossing the state from

east to west. In Ohio, however, the reverse is the case; most of the termini run in north and south lines. As one examines the card catalog he soon finds several types of distribution that are of frequent occurrence. By far the most common of these covers



FIG. 2. Range of *Oxydendrum arboreum* in Ohio.

the northeastern quarter of the state extending south to the present area along the lines of Merriam's map. This may be illustrated by the distribution of *Lycopodium* in Ohio (FIG. 1). Almost as conspicuous is a second group which extends north from the Ohio River and occupies a triangular area with its apex at Sugar Grove. The sorrel-tree, *Oxydendrum arboreum*, is a typical example (FIG. 2).

Each of these when the whole range of the plants concerned is taken into consideration is found to be a composite of several types of distribution. These together with others belonging to types not so conspicuously homogeneous within the state may be classified as follows:

A. ALLEGHENIAN PLANTS ON THE SOUTHWESTERN EDGES OF THEIR RANGES.

Type range, *BETULA LUTEA* (FIG. 3).

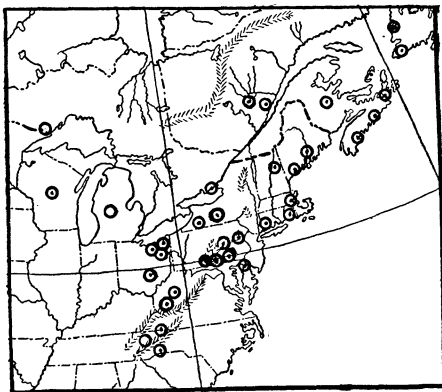
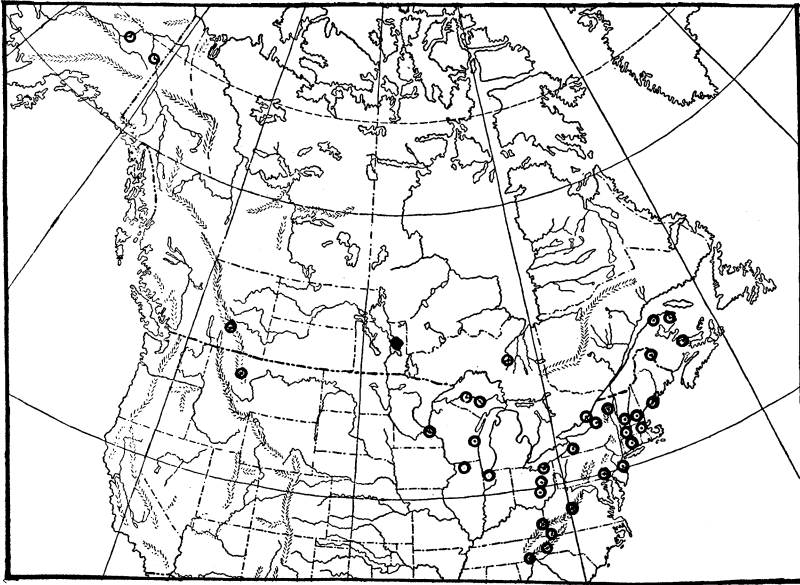


FIG. 3. Range of *Betula lutea*.

This list includes beside the Alleghenian plants which go no further west than the Lake Superior region, some Canadian plants which stretch across the continent. Though these are more northerly and fewer of them reach Ohio, the ranges of those that we do have are so similar to the Allegheny type that they are inseparable. *Capnoides sempervirens* (FIG. 4) and *Cornus canadensis*, which terminates about twenty miles north of our area, are typical examples. Although this is a very homogeneous group of plants, conforming very closely to the typical range, many of them are also found in outlying stations far removed from the main range, as for example *Blephariglotis lacera* and *Tsuga canadensis*. There is also a tendency which may become more evident when more collections are available, for some of them to extend into southwestern Ohio and southern Indiana, e. g. the chestnut. This list includes 39 species as follows:

FIG. 4. Range of *Capnoides sempervirens*.

<i>Achroanthus unifolia</i>	<i>Juncoides s altuensis</i>
<i>Aronia nigra</i>	<i>Lycopodium clavatum</i>
<i>Aster macrophyllus</i>	<i>Lycopodium complanatum</i>
<i>Betula lutea</i>	<i>Lycopodium lucidulum</i>
<i>Blephariglotis lacera</i>	<i>Lycopodium lucidulum poro-</i>
<i>Capnoides sempervirens</i>	<i>philum</i>
<i>Chimaphila maculata</i>	<i>Lycopodium obscurum</i>
<i>Chrysosplenium americanum</i>	<i>Lysias orbiculata</i>
<i>Circaea alpina</i>	<i>Lysimachia quadrifolia</i>
<i>Cypripedium acaule</i>	<i>Melampyrum lineare</i>
<i>Cypripedium reginae</i>	<i>Panicularia elongata</i>
<i>Epigaea repens</i>	<i>Panicularia pallida</i>
<i>Fraxinus nigra</i> *	<i>Parnassia caroliniana</i>
<i>Gaultheria procumbens</i>	<i>Polygonum arifolium</i> †
<i>Gentiana crinita</i>	<i>Pyrola elliptica</i>
<i>Isotria verticillata</i>	<i>Pyrola rotundifolia</i>

* The Ohio and Indiana (fide Coulter) distribution would indicate that this belongs in group F, but I follow Hough's map and place it here. It is unknown south of Columbus.

† Too widely extended in Indiana and Georgia to be typical.

<i>Rubus odoratus</i>	<i>Trollius laxus</i>
<i>Rynchospora glomerata</i>	<i>Tsuga canadensis</i>
<i>Sambucus pubens</i>	<i>Unifolium canadense</i>
<i>Saxifraga virginensis</i>	<i>Viola rostrata.</i>

B. APPALACHIAN AND NEW ENGLAND SPECIES ON THE WESTERN EDGES OF THEIR RANGES (reaching Maine but not extending west of Lake Erie).

Type range, SERICOCARPUS ASTEROIDES (FIG. 5).

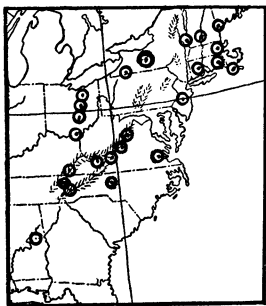


FIG. 5. Range of *Sericocarpus asteroides*.

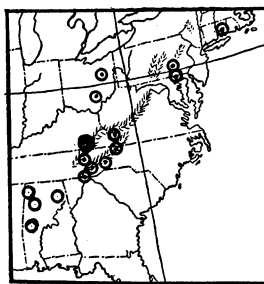


FIG. 6. Range of *Asplenium montanum*.

The lines separating this group of plants from the preceding and following categories are somewhat arbitrary. There are many plants of evident boreal affinities which are now confined to the Appalachians. Their ranges form a continuous series between the typical Alleghenian, extending from Newfoundland to Lake Superior, down to those like *Abies Fraseri* and *Tsuga caroliniana* which are confined to a small area in the highest part of the southern mountains. Those which reach Ohio, however, seem to fall rather naturally into the two categories here listed. Those of the first group number 14 and include:

<i>Aster divaricatus</i>	<i>Kalmia latifolia</i>
<i>Carex costellata</i>	<i>Panicularia acutiflora</i>
<i>Castanea dentata</i>	<i>Pinus rigida</i>
<i>Dasystoma laevigata</i>	<i>Quercus Prinus</i>
<i>Eatonia nitida</i>	<i>Rhododendron maximum</i>
<i>Hieracium paniculatum</i>	<i>Sericocarpus asteroides</i>
<i>Hieracium venosum</i>	<i>Viola rotundifolia.</i>

C. APPALACHIAN PLANTS (from southern New York or Connecticut to Ohio and south through the mountains).

Type range, *ASPLENIUM MONTANUM* (FIG. 6).

These ranges are in some cases difficult to distinguish from those of the Carolinian plants because their northern boundaries nearly coincide and because of the tendency to spread through southern Ohio into Indiana toward the Ozarks. In such cases the general affinities of the plant have been the criterion for decision. Thus *Aruncus Aruncus* is placed here because the same or a closely related species is found on the Pacific coast to Alaska thereby clearly indicating its boreal affinities although its distribution in the eastern United States is apparently clearly Carolinian. We have 12 plants belonging to this category as follows:

<i>Aruncus Aruncus</i>	<i>Phlox stolonifera</i>
<i>Asplenium montanum</i>	<i>Phacelia dubia</i>
<i>Asplenium pinnatifidum</i>	<i>Pinus virginiana</i>
<i>Azalea lutea</i>	<i>Silene rotundifolia</i>
<i>Cardamine rotundifolia</i>	<i>Stachys cordata</i>
<i>Oxydendrum arboreum</i>	<i>Viola hirsutula</i> .

D. CAROLINIAN PLANTS ON THE NORTHERN EDGES OF THEIR RANGES.

Type range, *PASSIFLORA LUTEA* (FIG. 7).

These are typically plants of southern or even subtropical affinity whose northern limits are largely determined by latitude. As might be expected, there is no such uniformity in the northern ranges of these plants as in those of the first group; *Ilex opaca*, *Quercus marylandica*, and *Liquidamber Styraciflua*, though members of this

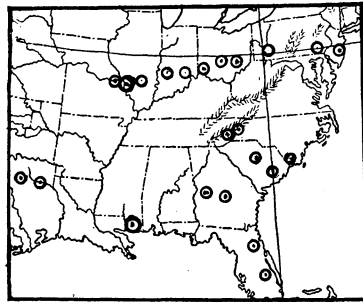


FIG. 7. Range of *Passiflora lutea*.

group, just reach the southern extremity of Ohio and do not come within 75 miles of Sugar Grove. The typical members of this group extend straight across the country at about the latitude of Philadelphia, but there is a strong tendency in many Carolinian plants like *Andropogon virginicus* (FIG. 8) to extend up the coastal

plain through New Jersey to Long Island or even to Massachusetts. These are starred (*) on the list. The coastwise distribution† of such plants finds its most striking exemplification in the occurrence

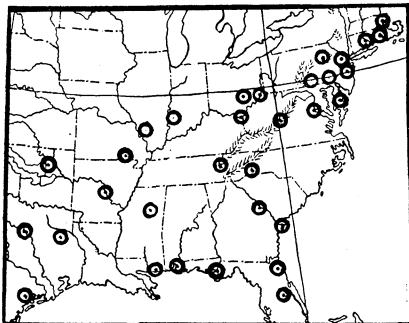


FIG. 8. Range of *Andropogon virginicus*.

of such a plant as *Schizaea pusilla* in Newfoundland.‡ The Carolinian plants which terminate at Sugar Grove number 32 and include:

* <i>Andropogon virginicus</i>	<i>Hydrangea arborescens</i>
<i>Aralia spinosa</i>	<i>Iris cristata</i>
* <i>Aristida dichotoma</i>	<i>Koellia incana</i> §
* <i>Asclepias variegata</i>	* <i>Lechea racemulosa</i>
* <i>Ascyrum multicaule</i>	<i>Lobelia leptostachys</i> §
* <i>Betula nigra</i> §	<i>Lobelia puberula</i>
<i>Blephariglottis paramoena</i>	<i>Napaea dioica</i> §
<i>Carduus virginicus</i>	<i>Panicum polyanthes</i>
* <i>Cassia nictitans</i>	<i>Panicum stipitatum</i> §
<i>Chrysopsis Mariana</i>	<i>Passiflora lutea</i>
<i>Cunila origanoides</i>	<i>Porteranthus stipulatus</i> §
<i>Dentaria heterophylla</i>	<i>Quercus minor</i>
<i>Diospyros virginiana</i>	* <i>Solidago erecta</i>
<i>Eupatorium aromaticum</i>	<i>Stylosanthes biflora</i>
<i>Eupatorium coelestinum</i>	<i>Trichostema dichotomum</i> §
* <i>Eupatorium rotundifolium</i>	<i>Trifolium reflexum</i> §

* Extending up the coastal plain into Long Island or New England.

† This interesting phenomenon has been described and its bearing discussed by Hollick, *Plant Distribution as a Factor in the Interpretation of Geological Phenomena* with especial reference to Long Island and vicinity. *Trans. N. Y. Acad. Sci.* 12: 189-202. 1893.

‡ See Fernald, l. c.

§ Not typical Carolinian plants. Of those marked thus, *Koellia incana*, *Panicum*

E. MISSISSIPPIAN PLANTS ON THE EASTERN EDGES OF THEIR RANGES.
Type range, *ISOPYRUM BITERNATUM* (FIG. 9).

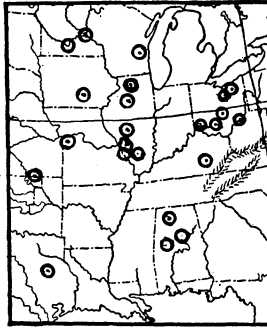


FIG. 9. Range of *Isopyrum biternatum*.

These are mostly plants characteristic of the great forest which once covered the Mississippi Valley and number 15 including:

<i>Aesculus octandra</i> *	<i>Isopyrum biternatum</i>
<i>Afzelia macrophylla</i>	<i>Psoralea Onobrychis</i>
<i>Asclepias Sullivantii</i>	<i>Quamasia hyacinthina</i> *
<i>Bidens aristosa</i>	<i>Smilax ecirrhata</i> *
<i>Brauneria purpurea</i> *	<i>Sullivantia Sullivantii</i>
<i>Dodecatheon Meadia</i> *	<i>Valeriana pauciflora</i> *
<i>Fraxinus quadrangulata</i>	<i>Veratrum Woodii</i>
<i>Hypericum Drummondii</i>	

F. PLANTS ON THE SOUTHERN EDGES OF THEIR RANGES.

Type range, *SCUTELLARIA GALERICULATA* (FIG. 10).

This appears to be a miscellaneous aggregation without much similarity in range except that they are northern but not mountain plants. Probably further study and comparison would discover common characteristics as conspicuous as in other groups. Some of them like *Anemone canadensis* are bounded by the Basin

stipitatum, and *Trichostema dichotomum* have boundaries running from northeast to southwest instead of east and west while *Napaea dioica* reverses the case and is reported northwestward as far as Minnesota. *Porteranthus stipulatus* and *Trifolium reflexum* are transitional between this and the next group in that they do not cross the mountains but stop in western New York. *Lobelia leptostachys* also is not known much beyond the mountains and is likewise transitional to the next group.

* Also known locally further east but the main body of the range stops in Central Ohio.

of the Great Lakes. Others like *Salix amygdaloides* have a wide distribution westward but taper eastward in a triangular area with its vertex in western New York, thus conforming to Harsh-

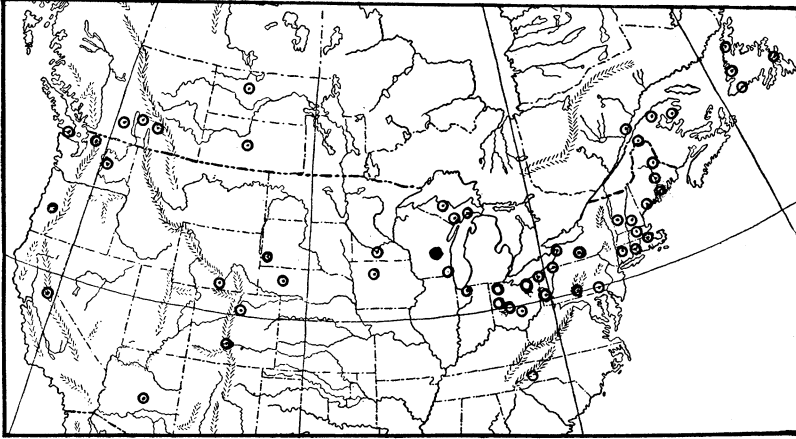


FIG. 10. Range of *Scutellaria galericulata*.

berger's* map of the Ohio-Tennessee area. 9 plants have been classed here as follows:

<i>Anemone canadensis</i>	<i>Salix amygdaloides</i>
<i>Cornus stolonifera</i>	<i>Saxifraga pennsylvanica</i>
<i>Dasyphora fruticosa</i>	<i>Scutellaria galericulata</i>
<i>Pedicularis lanceolata</i>	<i>Solidago juncea</i> .
<i>Populus tremuloides</i>	

In addition to those given above there is one anomalous case which fits into no natural geographical range which I can discover. *Viburnum dentatum* comes down to our area from the northeast and meets *Viburnum molle* which comes up from the southwest. The characters which separate these species moreover do not hold in this region. It is evident therefore either that we do not understand these species and have only one of them even though there is a distinct variation from one part of the state to the other, or that they are not good species.

The presence at one place of so many species on the edges of

* Harshberger, J. W. Phytogeographic Survey of North America. Veg. der Erde 13: facing 790. 1911.

their ranges affords a favorable opportunity to study also their behavior. Are they rare or abundant? Does their reproductive apparatus function normally? Do those plants on their northern edges behave differently from those on their southern? The eastern from the western? Is it possible to assign any reasons for the location of their termini here rather than fifty or a hundred miles beyond? These questions will be considered in a following paper.

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